No. 200200026

# THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

## Paragon Seed, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE , OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSES, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

*LETTUCE*

*'Wellton'*

*In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this nineteenth day of September, in the year two thousand and five.*

*Attest:*

*Commissioner*
*Plant Variety Protection Office*
*Agricultural Marketing Service*

*Secretary of Agriculture*

REPRODUCE LOCALLY. *Include form number and date on all reproductions.* FORM APPROVED - OMB NO. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE DIVISION - PLANT VARIETY PROTECTION OFFICE

# APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

*(Instructions and information collection burden statement on reverse)*

*The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a).*

*Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).*

1. NAME OF APPLICANT(S) *(as it is to appear on the Certificate)*
Paragon Seed, Inc.

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER
TR2

3. VARIETY NAME
Wellton

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*
507 Abbott Street
P.O. Box 1906
Salinas, California 93901

5. TELEPHONE *(include area code)*
831-753-2100

6. FAX *(include area code)*
831-753-1470

**FOR OFFICIAL USE ONLY**

PVPO NUMBER
200200026

FILING DATE
November 13, 2001

FEE RECEIVED
FILING AND EXAMINATION FEE: $ 2705 -
DATE: November 13, 2001
CERTIFICATION FEE: $ 680 -
DATE: August 2, 2005

7. GENUS AND SPECIES NAME
Lactuca sativa L.

8. FAMILY NAME *(Botanical)*
Compositae

9. CROP KIND NAME *(Common name)*
LETTUCE Iceberg Iceberg/Crisphead type

10. IF THE APPLICANT NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.) (Common name)*
Corporation

11. IF INCORPORATED, GIVE STATE OF INCORPORATION
California

12. DATE OF INCORPORATION
March 07, 1994

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS
Victor Heintzberger
Paragon Seed, Inc.
P.O. Box 1906
Salinas, California 93902-1906

14. TELEPHONE *(include area code)*
831-753-2100

15. FAX *(include area code)*
831-753-1470

16. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED *(Follow instructions on reverse)*

a. ☒ Exhibit A. Origin and Breeding History of the Variety
b. ☒ Exhibit B. Statement of Distinctness
c. ☒ Exhibit C. Objective Description of the Variety
d. ☐ Exhibit D. Additional Description of the Variety
e. ☒ Exhibit E. Statement of the Basis of the Applicant's Ownership
f. ☒ Voucher Sample *(2,500 viable untreated seeds or, for tuber propagated varieties verification that tissue culture will be deposited and maintained in a public repository)*
g. ☒ Filing and Examination Fee ($2,460), made payable to "Treasurer of the United States" *(Mail to PVPO)*

17. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY, AS A CLASS OF CERTIFIED SEED? *(See Section 83(a) of the Plant Variety Protection Act)?*
☐ YES *(If "yes," answer items 18 and 19 below)* ☒ NO *(If "no," go to item 20)*

18. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
☐ YES ☐ NO

19. IF "YES" TO ITEM 18, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED

20. HAS THE VARIETY OR A HYBRID PRODUCED FROM THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?
☒ YES *(If "yes," give names of countries and dates)* ☐ NO
California July 19, 2001

21. The applicant(s) declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned applicant(s) is(are) the owner(s) of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Applicant(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.

| SIGNATURE OF APPLICANT *(Owner(s))* | | SIGNATURE OF APPLICANT *(Owner(s))* | |
|---|---|---|---|
| NAME *(Please print or type)* Victor Heintzberger | | NAME *(Please print or type)* | |
| CAPACITY OR TITLE President | DATE 11/02/01 | CAPACITY OR TITLE | DATE |

SD-470 (04-96) *(Previous editions are to be destroyed)*

*(See reverse for instructions and information collection burden statement)*

REPRODUCE LOCALLY. *Include form number and date on all reproductions*

Form Approved - OMB No. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

# APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

*(Instructions and information collection burden statement on reverse)*

*The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.*

*Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).*

1. NAME OF OWNER: PARAGON SEED, INC.

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME: TR2

3. VARIETY NAME: WELLTON

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*: P.O BOX 1906, SALINAS, CALIFORNIA 93902-1906

5. TELEPHONE *(include area code)*: 831-753-2100

6. FAX *(include area code)*: 831-753-1470

FOR OFFICIAL USE ONLY

PVPO NUMBER: 200200026

FILING DATE

7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.)*: CORPORATION

8. IF INCORPORATED, GIVE STATE OF INCORPORATION: CALIFORNIA

9. DATE OF INCORPORATION: MARCH 7, 1994

10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. *(First person listed will receive all papers)*

VICTOR HEINTZBERGER
PARAGON SEED, INC.
P.O. BOX 1906
SALINAS, CALIFORNIA 93902-1906

FEES RECEIVED

FILING AND EXAMINATION FEES: $ DATE

CERTIFICATION FEE: $ DATE

11. TELEPHONE *(Include area code)*: 831-753-2100

12. FAX *(Include area code)*: 831-753-1470

13. E-MAIL: LETTUCESEED@aol.com

14. CROP KIND *(Common Name)*: LETTUCE

15. GENUS AND SPECIES NAME OF CROP: Lactuca Sativa, L.

16. FAMILY NAME *(Botanical)*: COMPOSITAE

17. IS THE VARIETY A FIRST GENERATION HYBRID? ☐ YES ☒ NO

18. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)

- a. ☒ Exhibit A. Origin and Breeding History of the Variety
- b. ☒ Exhibit B. Statement of Distinctness
- c. ☒ Exhibit C. Objective Description of Variety
- d. ☐ Exhibit D. Additional Description of the Variety *(Optional)*
- e. ☒ Exhibit E. Statement of the Basis of the Owner's Ownership
- f. ☒ Voucher Sample *(2,500 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository)*
- g. ☒ Filing and Examination Fee ($2,705), made payable to "Treasurer of the United States" *(Mail to the Plant Variety Protection Office)*

19. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? *See Section 83(a) of the Plant Variety Protection Act)*

☐ YES *(If "yes", answer items 20 and 21 below)* ☒ NO *(If "no", go to item 22)*

20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES? ☐ YES ☐ NO

IF YES, WHICH CLASSES? ☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED

21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? ☐ YES ☐ NO

IF YES, SPECIFY THE NUMBER 1,2,3, etc. ☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED

*(If additional explanation is necessary, please use the space indicated on the reverse.)*

22. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U. S. OR OTHER COUNTRIES?

☒ YES ☐ NO

IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. *(Please use space indicated on reverse.)*

23. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT *(PLANT BREEDER'S RIGHT OR PATENT)*?

☒ YES ☐ NO

IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. *(Please use space indicated on reverse.)*

24. The owners declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Owner(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF OWNER: Victor Heintzberger

NAME *(Please print or type)*: VICTOR HEINTZBERGER

CAPACITY OR TITLE: 2 PRESIDENT

DATE: 12/10/01

SIGNATURE OF OWNER

NAME *(Please print or type)*

CAPACITY OR TITLE

DATE

GENERAL: To be effectively filed with the Plant Variety Protection Office (PVPO), ALL of the following items must be received in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E; (3) for a seed reproduced variety at least 2,500 viable untreated seeds (for a hybrid variety at least 2,500 untreated seeds of each line necessary to reproduce the variety, or for tuber reproduced varieties verification that a viable *(in the sense that it will reproduce an entire plant)* tissue culture will be deposited and maintained in an approved public repository; (4) check drawn on a U.S. bank for $2,70 ($320 filing fee and $2,385 examination fee), payable to "Treasurer of the United States" *(See Section 97.6 of the Regulations and Rules of Practice.)* Partial applications will be held in the PVPO for not more than 90 days, then returned to the applicant as unfiled. Mail application and other requirements to Plant Varie Protection Office, AMS, USDA, Room 500, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. DO NOT use masking materials to make corrections. If a certificate is allowed, you will be requested to send a check payable to "Treasurer of the United States" in the amou of $320 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

20020028

**Plant Variety Protection Office**
**Telephone: (301) 504-5518**
**FAX: (301) 504-5291**
**Homepage:** http://www.ams.usda.gov/science/pvpo/pvp.htm

ITEM

18a. Give:
(1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;
(2) the details of subsequent stages of selection and multiplication;
(3) evidence of uniformity and stability; and
(4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified

18b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:

(1) identify these varieties and state all differences objectively;
(2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences; and
(3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.

18c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.

18d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, *etc.*

18e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.

19. If "Yes" is specified *(seed of this variety be sold by variety name only, as a class of certified seed)*, the applicant MAY NOT reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. *(See Regulations and Rules of Practice, Section 97.103).*

22. *See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.*

23. *See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.*

21. CONTINUED FROM FRONT *(Please provide a statement as to the limitation and sequence of generations that may be certified.)*

22. CONTINUED FROM FRONT *(Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)*

FIRST COMMERCIAL SALE JULY 19, 2001 CALIFORNIA, U.S.A
TRIAL SAMPLE SENT TO ELSOMS SEED PTY SPALDING, ENGLAND 5/29/01

23. CONTINUED FROM FRONT *(Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)*

RAIDER SEMINIS VEGETABLE SEEDS, INC. PVP # 8900281

NOTES: It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. There is no charge for filing a change of address. The fee for filing a change of ownership or assignment or any modification of owner's name is specified in Section 97.175 of the regulations. *(See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the Regulations and Rules of Practice.)*

To avoid conflict with other variety names in use, the applicant must check the variety names proposed by contacting: Seed Branch, AMS, USDA, Room 213, Building 306, Beltsville Agricultural Research Center--East, Beltsville, MD 20705. Telephone: (301) 504-8089. http://www.ams.usda.gov/lsg/seed/ls-sd.htm

# EXHIBIT A

## BREEDING HISTORY WELLTON

'Wellton' is a new iceberg lettuce variety developed by crossing an experimental iceberg numbered line from Synergene Seed & Technology and the variety Raider. This cross was made to incorporate the desirable vanguard traits of Synergene '89R25' such as thick texture, dark green color, and smooth butt appearance with the bolt tolerance and tipburn resistance of Raider.

A cross was made in a greenhouse near Salinas, California in June of 1995. The cross was made using the technique outlined by Ryder and Johnson in "Mist depollination of Lettuce Flowers", published in HortScience, Vol. 9(6), 1974. Seed of the cross was harvested on July 2, 1995. In this case, seed from several blossoms were massed for a composite of eighteen white (silver) F1 seeds. This cross was designated 'TR'.

$F_1$ to $F_2$ seed was produced in the San Joaquin Valley during the summer of 1996, and $F_2$ lines were evaluated in Yuma, Arizona for heading ability, wrapper leaf protection, and bolt tolerance. One line, designated 'TR2' was superior to sister lines for desirable plant types in a segregating population.

$F_3$ seed of 'TR2' was produced in the San Joaquin Valley of California during the summer of 1997. Ten individual plants selections were harvested and designated 'TR2-1' thru 'TR2-10'. The seed color of all selections was white. A sister line 'TR-5' was also increased with ten selections of which seed color was segregating black and white. This line was later discarded in favor of 'TR2'.

$F_3$ seed of 'TR2' selections were evaluated in Yuma, Arizona in the fall of 1997. In replicated trials, the selection 'TR2-1' was medium to medium large in frame size, medium-to-medium large head size, and exhibited a smooth butt appearance similar to the pollen parent Raider. Slight leaf type segregation indicated selection work to continue for a plant with head protection similar to '89R25' and the heading uniformity and bolt tolerance of Raider.

$F_4$ seed of 'TR2-1-1' was produced in the San Joaquin Valley of California during the summer of 1998. Trials of this breeding line were evaluated in the Imperial Valley of California and in Yuma, Arizona in the fall of 1998. Uniformity to type was improving at this generation, with a unique plant type intermediate between the two parental lines.

## EXHIBIT A

## BREEDING HISTORY WELLTON

The new line showed the better texture and sizing of the maternal line '89R25', and the bolt tolerance, tipburn resistance and heading conformation of Raider. Seed color was fixed as white, similar to the maternal line.

Single plant selections and trial evaluations continued through the fall of 1999 in Huron, California and Yuma, Arizona.

In the summer of 2000, a mass selection of 'TR2-1-1 (pxl-10)' was increased for initial field-testing of the new line. Concurrent with seed multiplication near Corcoran, California production trials were planted near Huron, California to evaluate the new variety under commercial lettuce growing conditions. The 'TR2' line performed well against field standards such as Sun Devil, Lighthouse, and Fallgreen.

After reviewing trials in King City and Huron, California and Yuma, Arizona during the year of 2000, the decision was made to produce seed of 'TR2' on a commercial scale during the summer production cycle of 2001 near Corcoran, California.

The name 'Wellton' was cleared for use on May 07, 2001 to coincide with the release of the new variety in the summer of 2001.

The first seed of the variety was sold on July 19, 2001 and planted near San Ardo, California. The crop was harvested successfully on September 25, 2001.

Wellton has been observed for three generations of reproduction and during the seed increase period and is stable and uniform. No variants were observed.

EXHIBIT B

NOVELTY STATEMENT WELLTON

'Wellton' most closely resembles the variety 'Raider', however;

Head size of 'Wellton' is larger than 'Raider' (x = 49.8 cm's vs. 48.2 cm's)

'Wellton' is earlier maturing based on solidity measurements (1 =soft, 3 = firm, 5 = hard) (x = 3.1 vs. x = 2.8) Head firmness of one unit represents approximately three growth days.

'Wellton' is slower bolting by measurement of core height (x = 2.0 in. vs. 2.4 in.)

The color of 'Wellton' is 143A vs. 141A for 'Raider' based on charts from the Royal Horticultural Society Colour Chart. Color comparison was made in August, 2001 near San Ardo, California. 'Wellton' is slightly duller in reflectance than 'Raider', with a slightly smoother leaf surface. (See photos Exhibit C)
Color comparisons made in Yuma, Arizona on November 17, 2004 confirm this data. (Pasquinelli Walls Ranch, Dome Valley)

'Wellton' is an iceberg lettuce in the vanguard class, best suited for production in the summer harvest period of the California coastal regions (King City, Gilroy), fall harvest in the Central San Joaquin Valley of California (Huron, Bakersfield) , and late November harvest in the southwest desert production areas of California (Imperial Valley) and Arizona.

*'Wellton' is most similar to the iceberg lettuce variety 'Raider', however:*

'Wellton' cotyledon leaf shape is "Round", whereas, 'Raider' is "Oval"

'Wellton' cotyledon leaf undulations are "Slight", whereas, 'Raider' is "Medium"

'Wellton' mature leaf indentation is "Crenate", whereas, 'Raider' is "Shallowly dentate".

'Wellton' leaf trichomes are "Present, whereas, 'Raider' is "Absent"

'Wellton' Butt midrib is 'Flat', whereas, 'Raider' is "Moderately raised".

EXHIBIT B

NOVELTY STATEMENT WELLTON

'Wellton' seed color is "Silver", whereas, 'Raider' seed color is "Black".

'Wellton' is earlier is earlier in maturity than 'Fallgreen', with a larger head size and lower core height. Seed color of 'Fallgreen' is black.
The variety 'Fallgreen' is obsolete in California and Arizona plantings as of 2005.

'Wellton' is adapted to a slightly earlier planting date in Arizona than 'Sun Devil'. Suggested sow dates for 'Wellton' in Yuma, Arizona is from September 8 to September 22. 'Sun Devil' planted as early at the 8th of September is susceptible to bolting.

'Wellton' leaf margin is best described as "Smooth", whereas, the outer leaf (wrapper) margin of 'Sun Devil' is "Intermediate frilled".

'Wellton' is best described as a vanguard type iceberg lettuce adapted to warmer growing conditions. 'Legacy' is best described as a cooler season vanguard type lettuce most similar to the variety 'Salinas'. 'Legacy' if planted in early desert plantings (September) would bolt prematurely, where 'Wellton' would produce marketable heads with a low core.

If 'Wellton' was planted in the Salinas Valley of California in January for harvest in April/May, heads would be small and unmarketable, whereas, 'Legacy' is adapted and would produce marketable lettuce.

Seed color of 'Wellton' is "White" (silver), whereas, seed color of 'Legacy' is "Black".

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE DIVISION

EXHIBIT C

# OBJECTIVE DESCRIPTION OF VARIETY
## LETTUCE *Lactuca sativa*

NAME OF APPLICANT (S)
Paragon Seed, Inc.

ADDRESS (Street and No. or R.F.D. No., City, State, and ZIP Code)
P.O. Box 1906

Salinas, California 93902-1906

FOR OFFICIAL USE ONLY

PVPO NUMBER
200200026

VARIETY NAME
Wellton

EXPERIMENTAL DESIGNATION
TR2

Place numbers in the boxes for the characters which best describe this variety. Measured data should be the mean of an appropriate number (at least 10) of well spaced plants. Royal Horticultural Society or any recognized color standard may be used to determine plant colors.

The location of the test area is:
Huron, California

Color System Used:
RHS

1. PLANT TYPE: *(See list of suggested check varieties page 4.)*

[0 6]

01=Cutting/Leaf
02=Butterhead
03=Bibb
04=Cos or Romaine
05=Great Lakes Group
06=Vanguard Group
07=Imperial Group
08=Eastern (Ithaca) Group
09=Stem
10=Latin
11=OTHER

2. SEED:

COLOR: [1]
1=White (Silver Gray)
2=Black (Gray Brown)
3=Brown (Amber)

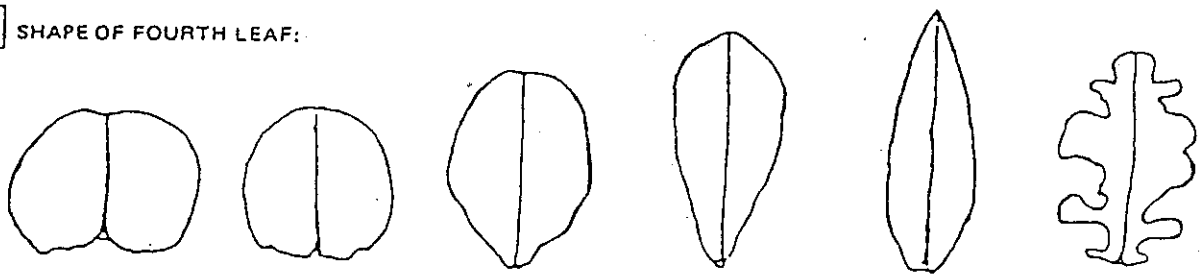
LIGHT DORMANCY: [1]
1=Light Required
2=Light Not Required

HEAT DORMANCY: [1]
1=Susceptible
2=Not Susceptible

3. COTYLEDON TO FOURTH LEAF STAGE: NOTE: Provide a color photograph or photocopy of the fourth leaf from 20 day old seedling grown under optimal conditions.

[2] SHAPE OF COTYLEDONS: 1=Broad 2=Intermediate 3=Spatulate

[2] SHAPE OF FOURTH LEAF:



1 2 3 4 5 6

[1 1] LENGTH/WIDTH INDEX OF FOURTH LEAF: L/W x 10

[3] APICAL MARGIN:
[5] BASAL MARGIN:
1=Entire 2=Crenate/Gnawed 3=Finely Dentate 4=Moderately Dentate 5=Coarsely Dentate 6=Incised 7=Lobed 8=OTHER *(specify)*

[2] UNDULATION: 1=Flat 2=Slight 3=Medium 4=Marked

[4] GREEN COLOR: 1=Yellow Green 2=Light Green 3=Medium Green 4=Dark Green 5=Blue Green 6=Silver Green 7=Gray Green

ANTHOCYANIN:

[1] DISTRIBUTION: 1=Absent 2=Margin Only 3=Spotted 4=Throughout 5=OTHER *(specify)*

[0] CONCENTRATION: 1=Light 2=Moderate 3=Intense

[2] ROLLING: 1=Absent 2=Present

[2] CUPPING: 1=Uncupped 2=Slight 3=Markedly

[1] REFLEXING: 1=None 2=Apical Margin 3=Lateral Margins

4. MATURE LEAVES *(observe harvest-mature outer leaves)*:

NOTE: Provide color photo of harvest-mature leaves which accurately shows color and margin characteristics.

MARGIN:

| | | | | |
|---|---|---|---|---|
| [2] | INCISION DEPTH: *(deepest penetration of the margin)* | 1=Absent/Shallow (Dark Green Boston) | 2=Moderate (Vanguard) | 3=Deep (Great Lakes 659) |
| [4] | INDENTATION: *(finest divisions of the margin)* | 1=Entire (Dark Green Boston)<br>2=Shallowly Dentate (Great Lakes 65) | 3=Deeply Dentate (Great Lakes 659)<br>4=Crenate (Vanguard) | 5=OTHER *(specify)* |
| [2] | UNDULATION OF THE APICAL MARGIN: | 1=Absent/Slight (Dark Green Boston) | 2=Moderate (Vanguard) | 3=Strong (Great Lakes 659) |
| [4] | GREEN COLOR: | 1=Very Light Green (Bibb)<br>2=Light Green (Minetto) | 3=Medium Green (Great Lakes)<br>4=Dark Green (Vanguard) | 5=Very Dark Green<br>6=OTHER |

ANTHOCYANIN *(grown at or below 10 C)*:

| | | | | |
|---|---|---|---|---|
| [1] | DISTRIBUTION: | 1=Absent<br>2=Margin Only (Big Boston) | 3=Spotted (Calif. Cream Butter)<br>4=Throughout (Prize Head) | 5=OTHER *(specify)* |
| [0] | CONCENTRATION: | 1=Light (Iceberg) | 2=Moderate (Prize Head) | 3=Intense (Ruby) |
| [2] | SIZE: | 1=Small | 2=Medium | 3=Large |
| [2] | GLOSSINESS: | 1=Dull (Vanguard) | 2=Moderate (Salinas) | 3=Glossy (Great Lakes) |
| [1] | BLISTERING: | 1=Absent/Slight (Salinas) | 2=Moderate (Vanguard) | 3=Strong (Prize Head) |
| [2] | LEAF THICKNESS: | 1=Thin | 2=Intermediate | 3=Thick |
| [2] | TRICHOMES: | 1=Absent (smooth) | 2=Present (spiny) | |

5. PLANT *(at market stage. Choose a comparison variety appropriate for this type.)*:

SPREAD OF FRAME LEAVES:
[5][2] cm This Variety [5][0] cm Raider *(specify comparison variety)*

HEAD DIAMETER *(market trimmed with single cap leaf)*:
[1][6] cm This Variety [1][5] cm Raider *(specify comparison variety)*

| | | | | |
|---|---|---|---|---|
| [3] | HEAD SHAPE: | 1=Flattened<br>2=Slightly Flattened | 3=Spherical<br>4=Elongate | 5=Non-Heading<br>6=OTHER |
| [2] | HEAD SIZE CLASS: | 1=Small | 2=Medium | 3=Large |

[2][4] HEAD COUNT PER CARTON

HEAD WEIGHT:
[7][5][4] g This Variety [7][2][6][ ] g Raider *(specify comparison variety)*

| | | | |
|---|---|---|---|
| [3] | HEAD FIRMNESS: | 1=Loose<br>2=Moderate | 3=Firm<br>4=Very Firm |

6. BUTT *(bottom of market-trimmed head)*:

| | | | | |
|---|---|---|---|---|
| [2] | SHAPE: | 1=Slightly Concave | 2=Flat | 3=Rounded |
| [1] | MIDRIB: | 1=Flattened (Salinas) | 2=Moderately Raised | 3=Prominently Raised (Great Lakes 659) |

7. CORE *(stem of market-trimmed head)*:

[3][8] mm Diameter at base of head

[ ][4].[2] Ratio of head diameter/core diameter

Core height from base of head to apex:
[8][0] mm This Variety [9][0] mm Raider *(specify comparison variety)*

8. BOLTING *(Give First Water Date 4/15/01)*:

NOTE: First Water Date is the date seed first receives adequate moisture to germinate. This can and often does equal the planting date.

Number of days from First Water Date to seed stalk emergence *(summer conditions)*:
[0][7][6] This Variety [0][7][8] Sun Devil *(specify comparison variety)*

| | | | | |
|---|---|---|---|---|
| [3] | BOLTING CLASS: | 1=Very Slow<br>2=Slow | 3=Medium<br>4=Rapid | 5=Very Rapid |

Height of mature seed stalk:
[1][1][6] cm This Variety [1][2][2] cm Sun Devil *(specify comparison variety)*



BOLTING cont'd. on next page

200200026

Spread of Bolter Plant *(at widest point)*:

[4][2] cm This Variety [3][8] cm Raider *(specify comparison variety)*

[2] BOLTER LEAVES: 1=Straight 2=Curved

[1] MARGIN: 1=Entire 2=Dentate

[2] COLOR: 1=Light Green 2=Medium Green 3=Dark Green

BOLTER HABIT:

[2] TERMINAL INFLORESCENCE: 1=Absent 2=Present

[2] LATERAL SHOOTS: *(above head)* 1=Absent 2=Present

[1] BASAL SIDE SHOOTS: 1=Absent 2=Present

9. MATURITY *(earliness of harvest-mature head formation)*:

NOTE: Complete this section for at least one season.

| SEASON | Applic. 1/ #of days | Check 1/ #of days | CHECK VARIETY 2/ |
|---|---|---|---|
| Spring | | | Not Adapted |
| Summer | 065 | 065 | Beacon |
| Fall | 076 | 074 | Lighthouse |
| Winter | | | Not Adapted |

n

Give planting date(s), and location(s):

Spring n/a

Summer plant 07/21/01 Harvest 09/25/01 San Ardo, California

Fall plant 09/07/00 Harvest 11/21/00 Roll, Arizona

Winter n/a

1/ First water date to harvest. 2/ Fill in check variety name on the appropriate line.

10. ADAPTATION:

PRIMARY REGIONS OF ADAPTION *(tested and proven adapted)*: (0=Not tested 1=Not Adapted 2=Adapted)

[2] Southwest *(Calif., Ariz. desert)* [2] West Coast [0] Northeast

[0] Northcentral [0] Southeast [ ] OTHER

SEASON:

[1] Spring (area ) [2] Fall (area ~~Imperial Valley, Ca~~ & Yuma, Az.

[2] Summer (area ~~King City, Huron~~, Ca. [0] Winter (area )

[0] GREENHOUSE: 0=Not tested 1=Not Adapted 2=Adapted

[1] SOIL TYPE: 1=Mineral 2=Organic 3=Both

200200026

11. DISEASES AND STRESS REACTIONS (0=Not tested; 1=Susceptible; 2=Intermediate; 3=Resistant; 4=Highly resistant; 5=Tolerant):

VIRUS

- [1] Big Vein
- [1] Lettuce Mosaic
- [0] Cucumber Mosaic
- [0] Broad Bean Wilt
- [0] Turnip Mosaic
- [0] Beet Western Yellows
- [0] Lett. Infectious Yellows
- [ ] Other Virus _____

FUNGAL/BACTERIAL

- [1] Corky Root Rot (Pythium Root Rot)
- [0] Downy Mildew (Races _____ )
- [0] Powdery Mildew
- [1] Sclerotinia Rot
- [0] Bacterial Soft Rot (Pseudomonas spp. & others)
- [0] Botrytis (Gray Mold)
- [ ] OTHER _____

INSECTS

- [0] Cabbage Loopers
- [0] Root Aphids
- [1] Green Peach Aphid
- [0] Other Insect _____

PHYSIOLOGICAL/STRESS

- [3] Tipburn
- [5] Heat
- [0] Drought
- [0] Cold
- [=] Salt
- [0] Brown Rib (Rib Discoloration, Rib Blight)
- [ ] OTHER _____

POST HARVEST

- [1] Pink Rib
- [1] Russet Sporting
- [0] Rusty Brown Discoloration
- [0] Internal Rib Necrosis (Blackheart, Gray Rib, Gray Streak)
- [0] Brown Stain

12. BIOCHEMICAL OR ELECTROPHORETIC MARKERS:

13. COMMENTS:

Adaptation Huron, California

fall plant 08/18/01 Harvest 10/24/01

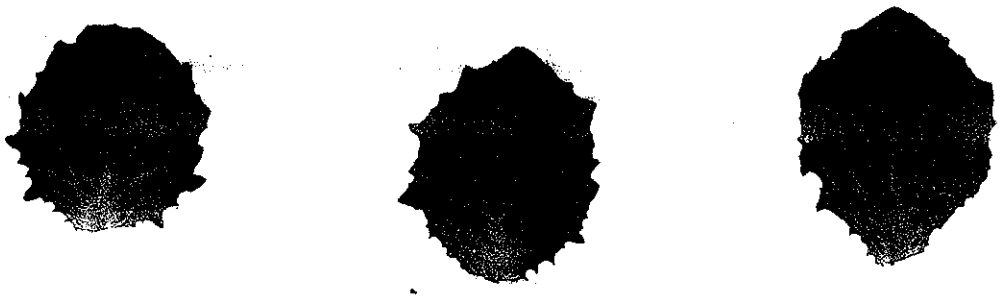
Wellton 61 days, Fallgreen 65 days, Pacer 65 days

SUGGESTED CHECK VARIETIES

| TYPE | CHECK VARIETY |
|---|---|
| 1) CUTTING/LEAF | SALAD BOWL |
| 2) BUTTERHEAD | DARK GREEN BOSTON |
| 3) BIBB | BIBB |
| 4) COS, OR ROMAINE | PARRIS ISLAND |
| 5) GREAT LAKES GROUP | GREAT LAKES 659-700 |
| 6) VANGUARD GROUP | VANGUARD |
| 7) IMPERIAL GROUP | VIVA |
| 8) EASTERN GROUP | ITHACA |
| 9) STEM | CELTUCE |
| 10) LATIN | MATCHLESS |

Paragon Seed, Inc.

# WELLTON

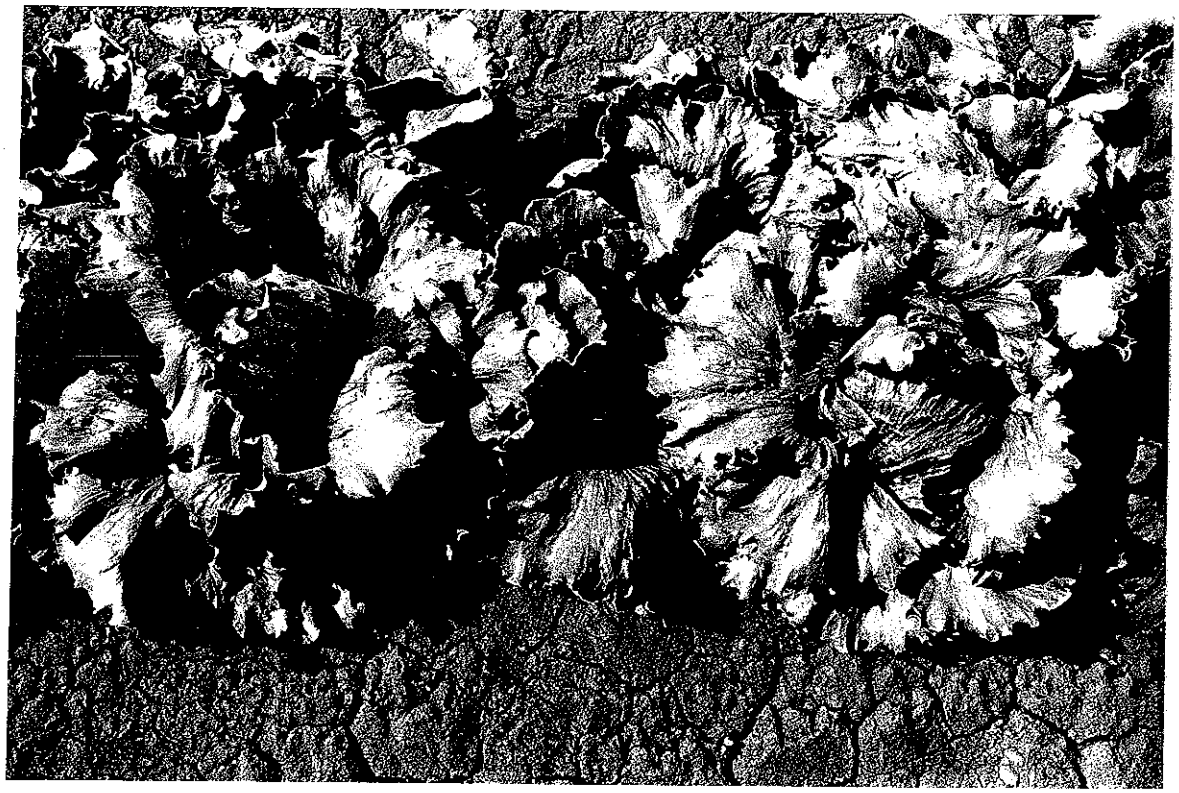


WELLTON SUN DEVIL RAIDER

Note : Photocopy of fourth leaf from 20 day old plant grown under optimum conditions.

WELLTON

RAIDER

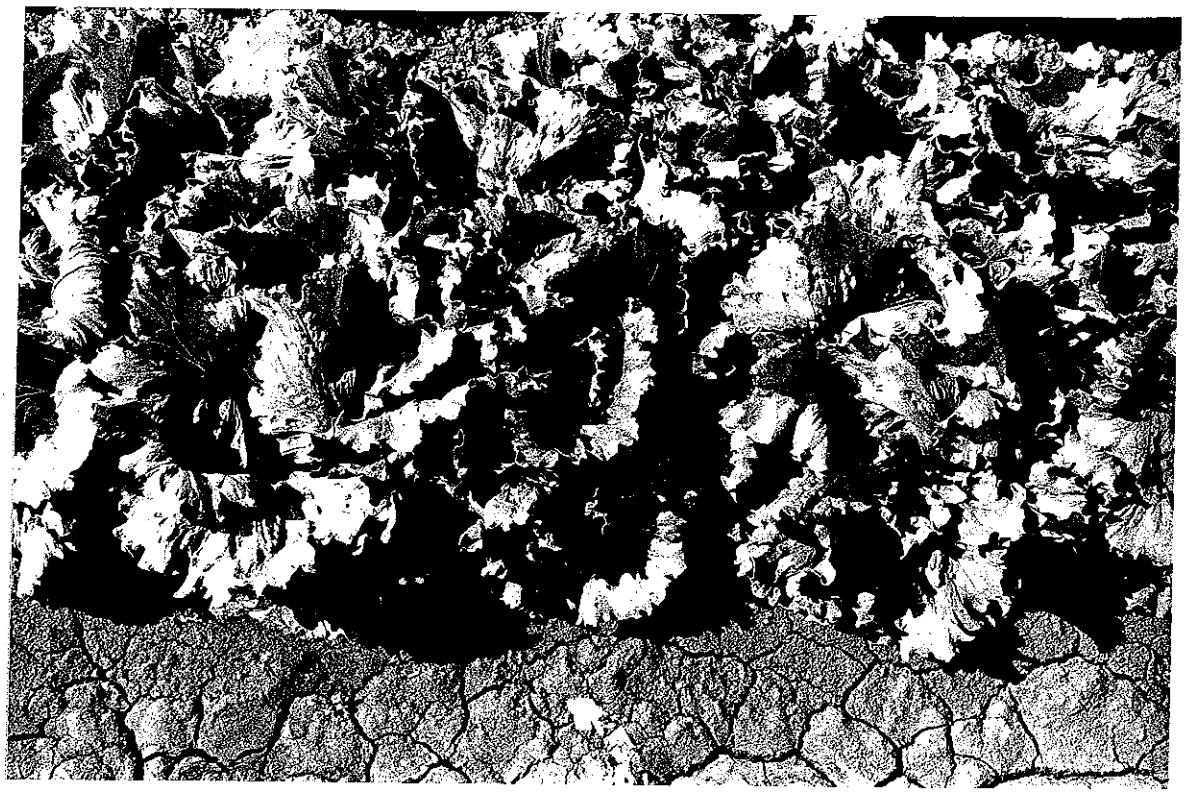


WELLTON

FALLGREEN

Paragon Seed, Inc. San Joaquin Valley Huron, California October 2001

WELLTON



PACER (Note leaf frill) Progeny Advanced Genetics

**Paragon Seed, Inc.** San Joaquin Valley Huron, California October 2001

WELLTON

Sun Devil (Note leaf frill) Progeny Advanced Genctics

# PARAGON SEED COMPANY

P.O. Box 1906 Salinas, Ca. 93902 831-753-2100

## Wellton vs Raider

**Salyer American Somerton, Az. Yarwood 7** **Harvest date : Nov. 22, 2004**

| | Wellton | Raider | Wellton | Raider | Wellton | Raider | Wellton | Raider |
|---|---|---|---|---|---|---|---|---|
| | Solidity | Solidity | Circum | Circum | Weight | Weight | Core Ht | Core Ht |
| Count | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| Sum | 73.0 | 70.0 | 1,212.0 | 1,197.5 | 17,600.0 | 17,175.0 | 41.25 | 57.25 |
| Mean | 3.04 | 2.92 | 50.50 | 49.90 | 733.33 | 715.63 | 1.72 | 2.39 |
| Maximum Value | 3.5 | 3.0 | 52.0 | 51.0 | 800.0 | 775.0 | 2.25 | 5.00 |
| Minimum Value | 2.5 | 2.5 | 49.0 | 48.5 | 700.0 | 675.0 | 1.50 | 1.50 |
| Variance | 0.04 | 0.04 | 0.52 | 0.39 | 797.10 | 641.98 | 0.06 | 0.71 |
| Std.Dev | 0.20 | 0.19 | 0.72 | 0.63 | 28.23 | 25.34 | 0.25 | 0.84 |
| Joint Variance | ***** | 0.04 | ***** | 0.46 | ***** | 719.54 | ***** | 0.39 |
| Jt Deg of Freedom | ***** | 46 | ***** | 46 | ***** | 46 | ***** | 46.00 |
| t-Test Parameter | ***** | 2.194 | ***** | 3.098 | ***** | 2.287 | ***** | 3.71 |
| Level of Significance | ***** | .0333 | ***** | .0033 | ***** | .0269 | ***** | .0006 |
| Confidence Level % | ***** | 96.668 | ***** | 99.669 | ***** | 97.315 | ***** | 99.94 |
| | 1-5 | 1-5 | Cm's | Cm's | Grams | Grams | Inches | Inches |
| MEASUREMENTS FOR SAMPLES | 3.0 | 3.0 | 51.0 | 49.5 | 775 | 700 | 1.75 | 2.00 |
| | 3.0 | 3.0 | 50.5 | 50.0 | 725 | 675 | 1.50 | 5.00 |
| | 3.0 | 3.0 | 52.0 | 50.5 | 800 | 725 | 1.50 | 2.00 |
| | 3.5 | 3.0 | 51.0 | 49.5 | 725 | 725 | 1.50 | 2.00 |
| Solidity measured on a scale of 1 to 5 | 3.0 | 2.5 | 50.0 | 50.0 | 700 | 700 | 1.50 | 2.00 |
| | 3.0 | 3.0 | 50.0 | 51.0 | 700 | 725 | 2.00 | 2.00 |
| | 3.5 | 3.0 | 50.0 | 50.0 | 725 | 700 | 1.50 | 2.00 |
| | 3.0 | 3.0 | 50.5 | 50.0 | 700 | 725 | 2.25 | 2.00 |
| Note: The Level of Significance is determined by using Excel 5's 2-tail type 2 built in T-test function directly over the ranges of data. | 3.0 | 3.0 | 51.0 | 49.5 | 750 | 675 | 2.00 | 1.50 |
| | 3.0 | 3.0 | 50.0 | 51.0 | 725 | 700 | 2.00 | 2.50 |
| | 3.0 | 2.5 | 50.0 | 50.0 | 725 | 725 | 2.00 | 2.50 |
| | 3.0 | 3.0 | 50.0 | 50.0 | 700 | 700 | 1.75 | 2.00 |
| | 3.0 | 3.0 | 50.5 | 50.5 | 750 | 725 | 2.00 | 2.00 |
| | 3.0 | 3.0 | 51.0 | 49.5 | 750 | 700 | 1.75 | 2.50 |
| | 3.5 | 3.0 | 52.0 | 51.0 | 775 | 725 | 2.00 | 2.25 |
| | 3.0 | 3.0 | 50.0 | 50.0 | 750 | 750 | 1.50 | 2.00 |
| | 3.0 | 3.0 | 50.0 | 50.0 | 725 | 700 | 1.50 | 2.25 |
| | 3.0 | 3.0 | 51.0 | 49.5 | 725 | 725 | 2.00 | 2.00 |
| | 3.0 | 3.0 | 51.0 | 50.0 | 750 | 675 | 1.50 | 2.50 |
| | 3.0 | 2.5 | 50.0 | 49.5 | 700 | 750 | 1.50 | 2.25 |
| | 2.5 | 3.0 | 50.0 | 50.0 | 725 | 775 | 1.50 | 2.00 |
| | 3.0 | 3.0 | 51.5 | 49.0 | 775 | 750 | 1.75 | 5.00 |
| | 3.0 | 3.0 | 49.0 | 48.5 | 700 | 725 | 1.50 | 2.50 |
| | 3.0 | 2.5 | 50.0 | 49.0 | 725 | 700 | 1.50 | 2.50 |



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# PARAGON SEED COMPANY

P.O. Box 1906 Salinas, Ca. 93902 831-753-2100

## Wellton vs Raider

**Pasquinelli Walls, Dome Valley, Arizona** — **Harvest date : Nov.24, 2004**

| | Wellton | Raider | Wellton | Raider | Wellton | Raider | Wellton | Raider |
|---|---|---|---|---|---|---|---|---|
| | Solidity | Solidity | Circum | Circum | Weight | Weight | Core Ht | Core Ht |
| Count | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| Sum | 74.3 | 66.8 | 1,237.0 | 1,206.5 | 18,300.0 | 17,400.0 | 42.25 | 50.00 |
| Mean | 3.09 | 2.78 | 51.54 | 50.27 | 762.50 | 725.00 | 1.76 | 2.08 |
| Maximum Value | 3.5 | 3.5 | 53.0 | 51.0 | 825.0 | 750.0 | 2.50 | 2.50 |
| Minimum Value | 3.0 | 2.0 | 50.0 | 49.5 | 700.0 | 675.0 | 1.50 | 1.75 |
| Variance | 0.03 | 0.14 | 0.67 | 0.28 | 815.22 | 489.13 | 0.09 | 0.03 |
| Std.Dev | 0.18 | 0.38 | 0.82 | 0.53 | 28.55 | 22.12 | 0.31 | 0.18 |
| Joint Variance | ***** | 0.09 | ***** | 0.48 | ***** | 652.17 | ***** | 0.06 |
| Jt Deg of Freedom | ***** | 46 | ***** | 46 | ***** | 46 | ***** | 46.00 |
| t-Test Parameter | ***** | 3.664 | ***** | 6.373 | ***** | 5.087 | ***** | 4.46 |
| Level of Significance | ***** | .0006 | ***** | .0000 | ***** | .0000 | ***** | .0001 |
| Confidence Level % | ***** | 99.936 | ***** | 100.000 | ***** | 99.999 | ***** | 99.99 |
| | 1-5 | 1-5 | Cm's | Cm's | Grams | Grams | Inches | Inches |
| MEASUREMENTS FOR SAMPLES | 3.0 | 2.0 | 52.0 | 50.5 | 700 | 725 | 1.75 | 2.00 |
| | 3.0 | 3.5 | 50.5 | 51.0 | 775 | 725 | 1.75 | 2.50 |
| | 3.5 | 3.0 | 52.0 | 51.0 | 775 | 750 | 2.50 | 2.25 |
| | 3.0 | 2.8 | 52.5 | 50.5 | 750 | 725 | 1.50 | 2.00 |
| Solidity measured on a scale of 1 to 5 | 3.3 | 3.0 | 53.0 | 50.0 | 800 | 700 | 2.00 | 2.00 |
| | 3.0 | 3.0 | 50.5 | 50.5 | 700 | 725 | 2.00 | 2.00 |
| | 3.0 | 3.0 | 52.0 | 50.0 | 750 | 700 | 2.00 | 2.00 |
| | 3.3 | 3.0 | 51.5 | 50.0 | 775 | 725 | 1.75 | 2.25 |
| Note: The Level of Significance is determined by using Excel 5's 2-tail type 2 built in T-test function directly over the ranges of data. | 3.0 | 2.5 | 52.0 | 49.5 | 750 | 675 | 1.50 | 2.25 |
| | 3.0 | 2.0 | 51.0 | 51.0 | 775 | 750 | 1.50 | 2.00 |
| | 3.0 | 3.0 | 52.0 | 49.5 | 800 | 725 | 1.75 | 2.00 |
| | 3.0 | 3.0 | 52.0 | 50.0 | 750 | 725 | 1.50 | 2.00 |
| | 3.3 | 3.0 | 52.0 | 51.0 | 775 | 725 | 1.50 | 2.00 |
| | 3.5 | 2.5 | 53.0 | 50.0 | 825 | 700 | 2.50 | 2.00 |
| | 3.0 | 2.8 | 52.0 | 50.5 | 750 | 725 | 2.00 | 2.00 |
| | 3.0 | 3.0 | 51.0 | 50.0 | 775 | 750 | 1.50 | 2.50 |
| | 3.0 | 2.0 | 51.5 | 51.0 | 775 | 725 | 1.50 | 2.00 |
| | 3.0 | 2.8 | 51.0 | 50.5 | 750 | 750 | 2.00 | 2.25 |
| | 3.0 | 3.0 | 51.0 | 49.5 | 775 | 675 | 1.50 | 1.75 |
| | 3.0 | 2.5 | 51.0 | 49.5 | 775 | 725 | 1.50 | 2.00 |
| | 3.0 | 3.0 | 50.0 | 50.0 | 725 | 750 | 1.50 | 2.25 |
| | 3.0 | 3.0 | 51.5 | 50.0 | 775 | 750 | 2.00 | 2.00 |
| | 3.0 | 3.0 | 52.0 | 51.0 | 750 | 750 | 1.50 | 2.00 |
| | 3.5 | 2.5 | 50.0 | 50.0 | 750 | 725 | 1.75 | 2.00 |

VEGETABLE RESEARCH AND INFORMATION CENTER
Vegetable Production Series

# ICEBERG LETTUCE PRODUCTION IN CALIFORNIA

***Louise Jackson,*** *Associate Professor/Cooperative Extension Specialist, Department of Vegetable Crops, University of California, Davis;* ***Keith Mayberry,*** *University of California Cooperative Extension Farm Advisor, Imperial County;* ***Frank Laemmlen,*** *University of California Cooperative Extension Farm Advisor, Santa Barbara County;* ***Steve Koike,*** *University of California Cooperative Extension Farm Advisor, Monterey County;* ***Kurt Schulbach,*** *University of California Cooperative Extension Farm Advisor, Monterey County; and* ***William Chaney,*** *University of California Cooperative Extension Farm Advisor, Monterey County*

## PRODUCTION AREAS AND SEASONS

The major production areas for iceberg (crisphead) lettuce *(Lactuca sativa)* in California are the central coast (Monterey, San Luis Obispo, San Benito, Contra Costa, and Santa Clara Counties), the southern coast (Santa Barbara and Ventura Counties), the Central Valley (Fresno, Kings, and Kern Counties), and the southern deserts (Imperial and Riverside Counties). Production is highest in Monterey County, followed by Imperial County.

Planting to harvest takes 70 to 80 days for midsummer plantings and as long as 130 days for late-fall plantings. In the southern deserts, iceberg lettuce is planted from mid-September to mid-November for harvest from early December to January and February. In the lettuce-growing areas of the central coast, where temperatures are fairly uniform year-round, lettuce is planted from late December to mid-August for harvest from early April to November. Southern coastal plantings are made from November to August for harvest from April to December. In the Central Valley, iceberg lettuce is planted from early August to early September for harvest from late October to mid-November. Spring plantings are made from early November to late December for harvest in April.

## ICEBERG LETTUCE ACREAGE AND VALUE

| Year | Acreage | Average yield (*tons/acre*) | Gross value/acre |
|---|---|---|---|
| 1994 | 128,500 | 17 | $4,862 |
| 1993 | 141,000 | 18 | $5,940 |
| 1992 | 147,000 | 18 | $4,680 |

*Source: California Agricultural Statistics 1994* (Sacramento: California Department of Food and Agriculture, 1995).

## CLIMATIC REQUIREMENTS

Lettuce is a cool-season crop with distinct temperature requirements. The optimal growing temperatures are 73°F (23°C) during the day and 45°F (7°C) at night. Most California growing regions have daytime temperatures from 63° to 83°F (17° to 28°C) and night temperatures from 37° to 53°F (3° to 12°C). At the high end of the temperature range, lettuce may bolt, causing bitterness and loose, fluffy heads, and tipburn is also common. At temperatures near freezing, young plants are not damaged, but growth is slow. Freezing can damage the outer leaves of mature lettuce, leading to decay in handling and storage.

## VARIETIES AND PLANTING TECHNIQUES

Lettuce varieties are adapted to specific planting periods in the Southern California deserts. Planting a variety out of slot will result in nonheading, puffiness, or bolting. Moderately high temperatures can occur in early spring. As the season progresses, temperatures change from extremely hot days to cooler days and freezing nights. Varieties commonly planted in Southern California include Empire, Fall Green, Tres Equis, Niner, Gilaben, Trendsetter, Del Rey, Annie, Diplomat, Rico, Desert Storm, Merit, Desert Queen, Honcho II, Early Giant, New Dominion, Winterset, Mt. Signal, Shilo, Kofa, Barn Burner, Pybas 251, Palmetto, Yuma, Sedona, Cool Breeze, Vancrisp, Vanmax, MOR 109, Vanmor, Prime Time, Winterhaven, Winter Supreme, Domingos 43, Red Coach 74, Coolguard, and Vanguard 75.

In the central coast, resistance to downy mildew and corky root diseases are important considerations for variety selection. Current varieties are the Salinas types, El Dorado, Target, Bronco, Pybas 251, Marksman, Vista Verde, Magnum, Wrangler, Premier, Stinger, Top Gun,

University of California • Division of Agriculture and Natural Resources
**Publication 7215**

Cowboy, Pybas 101, Pybas 102, Mustang, and Legacy. In the Central Valley, fall-planted varieties include Empire, Acacia, Desert Queen, Marvel, Raider, Fall Green, Gilaben, Diplomat, Maverick, Tres Equis, Redondo, Miner, Daybreak, Sundowner, and Fortuna. Tiber, a new USDA release, looks promising for tipburn resistance. Spring-planted varieties include Honcho II, Yuma, Coach Supreme, Westland, Winterset, Vanguard 75, and Vanmax. Late-spring plantings include Salinas, Titan, Vansal, Spector, Diamond, El Dorado, and Legacy.

Most iceberg lettuce is planted using pelleted seed and a precision planter; very little lettuce is transplanted in California. Seed are planted 2 to 3 inches (5–7.5 cm) apart in rows on 42-inch (105-cm) beds. At a 2-inch (5-cm) spacing there will be 157,000 seed per acre (388,000 seed/ha). The cost of seed varies with variety, coating, spacing, seed enhancement and priming (osmoconditioning) treatments. Nonprimed, natural lettuce seed may be susceptible to thermodormancy when ambient temperatures are above 90°F (32°C) for an extended period. Priming allows the seed to overcome thermodormancy and germinate at higher temperatures. Thermodormancy can also be broken by starting the initial irrigation in the late afternoon so the seed can imbibe water and germinate during the cooler hours of the night.

## SOILS

Iceberg lettuce grows best in silt loams and sandy soils in the southern deserts. Lighter-textured soils provide better drainage during cold weather and warm up more readily. In the central coast and Central Valley, lettuce can be grown on heavy clay soils as long as there is good soil structure and adequate drainage. Lettuce has a moderately low degree of salt tolerance: excess salinity results in poor seed germination and small heads.

## IRRIGATION

In the southern deserts, most growers use sprinklers for the first 5 to 7 days or until the seedlings emerge. The field is then furrow-irrigated for the remainder of the season. In the southern deserts 3 acre-feet (3,700 cu. m) of water per acre is typically used to grow a lettuce crop. The majority of the water is applied in the last 30 days before harvest. Care must be taken not to oversaturate the beds when growing early-season lettuce—excess moisture favors the development of bottom rot. Gated pipe is also used to deliver water, especially near harvest. Gated pipe allows uniform application of water down furrows and maintains a dry head basin so that harvest equipment can turn around on dry soil.

In the central coast, most fields are pre-irrigated with about 2 inches (5 cm) of water to soften the soil for seedbed preparation. Both seeded and transplanted lettuce are sprinkle-irrigated frequently until seedlings emerge or are established (usually 6 to 10 days). For direct-seeded lettuce, another sprinkler irrigation is applied about 2 to 3 weeks later to prepare the field for thinning. (Proper soil moisture makes it easier to thin the closely spaced seedlings.) After thinning, about two-thirds of the acreage is furrow-irrigated using gated pipe until harvest. Depending on soil type and terrain, some fields are sprinkled to maturity with hand-move, linear-move, or permanently buried sprinkler systems. In late summer or fall when corky root disease can be a problem, sprinkler irrigation is often used because the plants' root systems are degraded. Water application is typically 1.0 to 1.5 acre-feet (1,233–1,850 cu. m) per acre for a lettuce crop in the central coast. As the crop approaches maturity, excess water and fertilizer causes heads to become large and puffy, reducing their value.

A small but growing acreage of lettuce is drip-irrigated in the central coast. Both buried and surface drip tape are used. Water is applied with drip irrigation after the post-thinning cultivation. With buried drip systems, the tape is placed 7 to 12 inches (17.5–30 cm) deep in the center of the bed. Most growers use a manifold system so lines can be fed from either end of the field. This allows easy flushing of the system and prevents drought if there is a leak or blowout in the center of a row. Arizona/Sundance-style cultivation and field renovation equipment are used with buried drip systems. High iron content in water in some areas of the central coast create major plugging problems for subsurface drip users. Plugging by other precipitates, gopher damage, blowout, and cultivation and harvesting equipment damage are other common problems. Some microirrigation users prefer to lay surface drip tape down the center of the bed immediately after the post-thinning cultivation. The tape may be laid on the surface or buried 2 to 3 inches (5–7.5 cm) deep. Surface fabric pipe is used to deliver water to the tape. Lay-flat tape is often reeled in just before harvest; shallow-buried tape is reeled in after harvest has been completed.

## FERTILIZATION

In the southern deserts, 500 pounds per acre (560 kg/ha) of 11-52-0 is usually broadcast prior to listing. Nitrogen (N) is sidedressed just after thinning and during later growth. Early, warm-season lettuce requires less N than a crop grown in January and February. About 150 pounds of N per acre (168 kg/ha) is used for early-season crops, while 200 to 250 pounds per acre (224–280 kg/ha) is applied during cold weather.

In the central coast, fertilization begins with applying 50 to 70 gallons per acre (468–655 l/ha) of 6-16-6, 3-10-10, or 9-9-9 into the bed at listing. An alternate practice is to apply about 300 pounds per acre (336 kg/ha) of 6-20-20 in the bed at listing. There are usually from two to

four sidedressings applied at and after thinning. At thinning, 300 pounds per acre (336 kg/ha) of 15-8-4 is sidedressed into the beds, or 35 to 40 gallons per acre (327–374 l/ha) of UAN-32 (urea–ammonium nitrate, 32-0-0) or 500 pounds per acre (560 kg/ha) of 16-20-0 is siedressed. Two to three weeks later, 35 gallons per acre (327 l/ha) of UAN-32 or CAN-17 (calcium–ammonium nitrate, 17-0-0), or 40 to 45 gallons per acre (374–421 l/ha) of AN-20 (ammonium nitrate, 20-0-0) is applied to finish out the crop. A final application of 10 to 15 gallons per acre (94–140 l/ha) of AN-20 may be water-run if the grower feels the crop will run short of N prior to harvest. Typically, 200 to 220 pounds of N per acre (224–246 kg/ha) is applied to the early crops when the soil is cool, and 170 to 180 pounds per acre (190–202 kg/ha) of N is applied to the summer or fall crops. When corky root disease is high, growers increase application of N to compensate for the shallow, degraded root system. In some soils, lettuce will respond to applications of zinc.

Lettuce is very sensitive to overdoses of ammoniacal fertilizers. Seedling injury will be expressed by root burn, yellowing of the leaves, and dead plants. Fertilizer injury later in the season is expressed by wilting of the outer leaves and a rusty reddish discoloration in the middle of the plant root.

Manures and composts are rarely used in production of lettuce in the southern deserts. About two-thirds of the growers in the Salinas Valley, however, apply at least some manure to their lettuce. Manure is commonly applied at a rate of 4 tons per acre (9 t/ha) and is primarily applied to maintain good soil structure. In the Salinas Valley there is growing interest in using compost, which is applied at about the same rate as manure.

## INTEGRATED PEST MANAGEMENT

Contact the UC Davis IPM World Wide Web site at http://www.ipm.ucdavis.edu or your local county Farm Advisor for current pest management information (*UC IPM Pest Management Guidelines*, DANR Communication Services Publication 3339).

**Weed management.** Several herbicides are used for lettuce weed control. Some herbicides have greater activity on specific weed problems. Consult your weed control Farm Advisor for more details as to the best ones to use. Herbicides used on lettuce may be disked into the soil before bedding or applied preplant, postplant, or by air, depending on the product.

**Insect identification and control.** The most important insect pests of lettuce in California are worms, aphids, leafminers, and whiteflies. These pests cause problems according to the geographical region and time of year. In coastal areas, the pea leafminer (*Liriomyza huidobrensis*) is the most important pest. This insect removes plant tissue and can contaminate the harvested crop. Control strategies should be aimed at the larvae, not the more mobile, insecticide-resistant adults.

In Southern California, the silverleaf whitefly (*Bemisia argentifolii*) has caused slow growth and delayed maturity of the crop. Although this pest can be controlled with registered materials, it may become resistant if one chemical is used too heavily.

In all production areas, various worms, green peach aphids, and lettuce root aphids are always potential problems at various times of year and weather conditions. These should be managed by using selective materials to avoid making other problems more severe. Crops should be rotated to slow insecticide resistance.

**Disease identification and management.** In the southern deserts, the most serious diseases affecting iceberg lettuce are lettuce big vein virus, bottom rot, and lettuce drop. In coastal areas, young lettuce seedlings are rarely seriously affected by diseases, with the exception of downy mildew, which can cause damage during all phases of growth. Lettuce mosaic virus, corky root disease, and bacterial leaf spot can also be a problem in coastal areas. In the Central Valley, lettuce can be affected by *Fusarium* wilt and lettuce drop.

Lettuce mosaic (LMV), big vein (LBVa), beet western yellows (BWY), and turnip mosaic (TuMV) are viral diseases that affect lettuce. With the exception of LMV, these viruses are of moderate concern and control measures are rarely needed. LMV can be controlled by using mosaic-free seed (i.e., no virus in 30,000 seed). Other management steps include selecting resistant cultivars, controlling aphid vectors, removing weed hosts, and plowing down harvested fields that can harbor viruses. A lettuce-free period, which creates a break in the virus cycle during the winter, is mandated by county ordinance in some coastal areas.

Lettuce drop (*Sclerotinia minor* and *S. sclerotiorum*) is a serious soilborne fungal disease that can affect crops from rosette stage until harvest. Rotate crops and use protectant fungicides after thinning and before leaves get too large to provide some protection. Lettuce drop caused by *S. sclerotiorum*, rarely found in coastal areas, is common in the southern deserts.

Bottom rot (*Rhizoctonia solani*) can cause serious losses in the San Joaquin Valley and the southern desert areas; it is rarely seen elsewhere in the state. The disease is most prevalent on early-season lettuce that matures between the end of November and mid-January. Use fungicidal sprays to control this disease.

Downy mildew (*Bremia lactucae*) is managed by planting resistant cultivars and applying protectant fungicides. However, the genetic variability of this pathogen results in some strains that are not controlled by fungicides or resistant cultivars.

Bacterial leaf spot (*Xanthomonas campestris* pv. *vitians*), varnish spot (*Pseudomonas cichorii*), anthracnose (*Microdochium panattonianum*), and powdery mildew

(*Erysiphe cichoracearum* f. sp. *lactucae*) are foliar diseases that can affect developing lettuce. Favored by the wet, cool conditions of spring, bacterial leaf spot can be only partially controlled by copper fungicides; other control options are not yet available. Because the varnish spot bacterium is found in reservoir water, avoiding sprinkler irrigation usually eliminates this disease. Anthracnose is found only in fields where the resting fungal structure is present in soil during rainy spring weather. Application of protectant fungicides controls this pathogen; avoid planting lettuce in fields with a history of the disease. Powdery mildew is rarely a problem in commercial fields, and control options are not recommended.

Corky root is caused by the soilborne bacterium *Rhizomonas suberifaciens*. Rotate crops so that lettuce is not planted consecutively in the same fields and avoid over-fertilizing with N. However, for infected crops, growers may need to add supplemental fertilizer and water to achieve satisfactory crop yields. Some resistant cultivars are now available.

*Fusarium* wilt (*Fusarium* sp.) of lettuce is found only in the Central Valley. Because it is a new disease of lettuce, control options are limited. Growers should take precautions so that infested soil is not moved to clean fields.

**Other pests and disorders.** Freezing injury on mature lettuce is expressed as blistering and peeling of the epidermis followed by browning of the tissues. Normally freezing injury is confined to the cap and wrapper leaves. Tipburn is a physiological disorder caused by the lack of mobility of calcium in the heads during warm weather and rapid growing conditions. There is presently no control for lettuce tipburn.

## HARVEST AND HANDLING

Iceberg lettuce is field-packed into cartons. About 60 percent of lettuce is harvested by ground packing (naked packed, as opposed to wrapped). In ground packing, crews of approximately 20 to 30 are split into units (trios) that consist of two cutters and a packer. Trio members often rotate jobs and are normally paid by the number of cartons packed. The solid lettuce heads are cut, trimmed to 4 to 5 wrapper leaves, and packed 24 per carton. A carton has a minimum gross weight of 50 pounds (22.7 kg). About 40 percent of lettuce is wrapped at harvest. Cut and trimmed heads (wrapper leaves removed) are stacked on a table, and workers then wrap and seal each head in film or a plastic bag. The wrapped heads are packed with either 24 or 30 heads per carton. Lettuce in cartons is vacuum cooled prior to storage in a cold room. Vacuum cooling removes field heat in roughly 15 minutes.

Some companies contract, grow, and handle bulk lettuce as their primary product. At harvest, all wrapper leaves are removed in the field. Heads are packed in bins approximately 1 cubic yard in volume for precooling and transport. At the processing plant, heads can be further trimmed, cored, cooled, washed, and precut into various types of retail packages for the food-service industry. The entire processing plant is maintained at 35° to 40°F (1.7° to 4.5°C) to help maintain crispness and freshness.

## POSTHARVEST HANDLING

Lettuce is highly perishable and should be cooled as soon as possible after harvesting. Vacuum cooling reduces product temperature to 34°F (1°C); it should then be stored just above freezing at 98 percent relative humidity. Lettuce harvested at prime maturity with no major defects may be held for 2 to 3 weeks at 34°F. At 37°F (3°C), shelf life is reduced to 1 to 2 weeks. Russet spotting is a disorder caused by storing lettuce in containers or cold rooms where ethylene gas, which can be generated by ripening fruits and gasoline engines, is present. Brown stain is a storage disorder caused by high carbon dioxide levels in the cold room.

Iceberg lettuce is sold in many types of packages. Fifty-pound (22.7-kg) cartons containing 24 or 30 wrapped or naked-packed heads are common. Processed iceberg lettuce (chopped, cleaned, or cored) is shipped in 1,000-pound (454-kg) bins. Food-service packs include one 20-pound (9-kg), four 5-pound (2.25-kg), or two 10-pound (4.5-kg) cartons. There are also packages containing 6 heads that are cleaned and trimmed or cored and trimmed.

## MARKETING

California produces iceberg lettuce year-round. Supplies peak in May and June and are lowest in December, January, and February. California's lower volume during the winter is due to large supplies coming from western Arizona; the overall national supply is nearly static. Most of California's iceberg lettuce is shipped by refrigerated truck to markets throughout the United States and Canada. Limited quantities are shipped by air, mostly to export markets in Europe. Iceberg lettuce products are used by fast-food outlets, restaurants, institutions, airlines, and schools.



74-pr-11/96-SB

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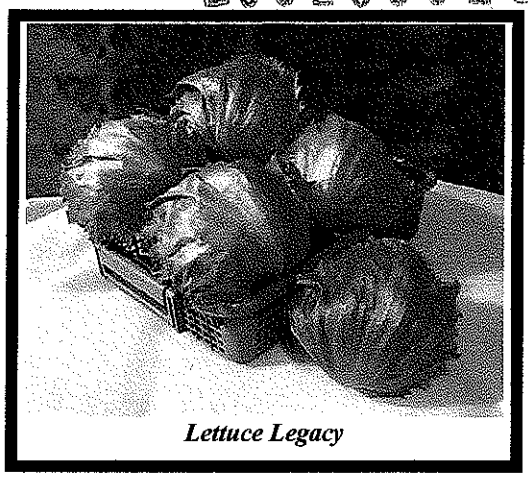

*Lettuce Legacy*

# LETTUCE LEGACY

| | |
|---|---|
| DESCRIPTION: | Medium large-sized head, deep green in color, Iceberg type |
| MATURITY: | Early/medium |
| COMPARABLE VARIETIES: | Salinas types |
| CULTURAL CHARACTERISTICS: | Legacy has vigorous growth and produces large, uniform heads with good wrap under low temperatures. Growing season is late spring and fall. |
| ADAPTABILITY: | Arizona, California |

| FEATURES | BENEFITS |
|---|---|
| • Strong cold tolerance | • Early season harvest |
| • Good uniformity and wrap | • Desirable market qualities |
| • Crisp, large heads | |
| • Vigorous growth | |



10/04

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U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

# EXHIBIT E
# STATEMENT OF THE BASIS OF OWNERSHIP

*The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.*

*Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).*

1. NAME OF APPLICANT(S)

Paragon Seed, Inc.

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER

TR2

3. VARIETY NAME

Wellton

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP, and Country)*

P.O. Box 1906

Salinas, California
93902-1906

5. TELEPHONE *(include area code)*

831-753-2100

6. FAX *(include area code)*

831-753-1470

7. PVPO NUMBER

200200026

8. Does the applicant own all rights to the variety? *Mark an "X" in appropriate block.* If no, please explain. [X] YES [ ] NO

9. Is the applicant (individual or company) a U.S. national or U.S. based company? [X] YES [ ] NO
If no, give name of country

10. Is the applicant the original owner? [X] YES [ ] NO *If no, please answer one of the following:*

a. If original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. national(s)?

[ ] YES [ ] NO If no, give name of country

b. If original rights to variety were owned by a company(ies), is(are) the original owner(s) a U.S. based company?

[ ] YES [ ] NO If no, give name of country

11. Additional explanation on ownership *(if needed, use reverse for extra space)*:

PLEASE NOTE:

Plant variety protection can be afforded only to owners (not licensees) who meet one of the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.

2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.

3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definition.